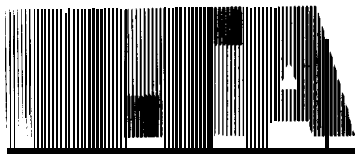


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FILE



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December 4, 1992

Ms. Donna Searcy
Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

RECEIVED
DEC - 4 1992
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20541

Re: ET Docket No. 92-28, Amendment of Section 2.106 of the Commission's Rules to Allocate the 1610-1626.5 MHz and the 2483.5-2500 MHz Bands for Use by the Mobile-Satellite Service, including Non-geostationary Satellites

Dear Ms. Searcy:

Enclosed are the original and required copies of the comments of Loral Qualcomm Satellite Services, Inc., in the above-captioned proceeding. Please direct any questions to the undersigned.

Sincerely yours,

Leslie A. Taylor
Counsel for Loral Qualcomm Satellite Services, Inc.

Enclosure

cc: Raymond LaForge, Office of Engineering and Technology

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**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

DEC - 4 1992

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| In the Matter of |) | |
| |) | |
| Amendment of Section 2.106 of |) | ET Docket No. 92-28 |
| the Commission's Rules to |) | RM-7771 PP-29 PP-32 |
| Allocate the 1610-1626.5 MHz |) | RM-7773 PP-30 PP-33 |
| and the 2483.52500 MHz Bands |) | RM-7805 PP-31 |
| for Use by the Mobile-Satellite |) | RM-7806 |
| Service, Including Non- |) | |
| Geostationary Satellites. |) | |

COMMENTS OF LORAL QUALCOMM SATELLITE SERVICES, INC.

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December 4, 1992

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EXECUTIVE SUMMARY

LQSS supports adoption, in the U.S. Table of Allocations, of the 1610-1626.5 MHz band in the Earth-to-space direction, and the 2483.52500 MHz band, in the space-to-Earth direction, to support the introduction of low-earth orbit satellites providing important new communications services. The Commission should not, however, adopt the allocation of 1613.8-1626.5 MHz in the space-to-Earth direction, because downlink operations in the L-band will cause harmful interference to primary uplink transmission of other mobile satellites as well as to operations of other systems, including those of radioastronomy, GLONASS and GLONASS-M. Permitting operation in the 1613.8-1626.5 MHz band in the space-to-Earth direction could preclude multiple entry in the provision of service from low-earth orbit satellites, as well as subject the United States to severe difficulties in the international telecommunications community.

The Commission should adopt spread spectrum CDMA as the appropriate access method for use by low-earth orbit satellites in the 1610-1626.5 MHz and 2483.5-2500 MHz band because CDMA will enable compatible co-channel operations of multiple systems, resulting in the most available capacity and consumer choice. Neither FDMA nor TDMA systems should be permitted as they will not utilize the spectrum in the most efficient manner, will not allow for multiple entry, and will cause interference into the operations of other services.

The Commission should utilize the RDSS/MSS allocation for low-earth orbit mobile satellite systems, such as LQSS's Globalstar. The Commission should not authorize AMSC to operate in these bands, as AMSC is authorized to provide service on a monopoly basis, in 28 MHz of spectrum, and has an application pending for use of an additional 35 MHz (other than the 1616.5-1626.5 MHz applied for by AMSC). As an allocation matter, geostationary as well as non-geostationary systems can be permitted access to these frequencies so long as the Commission requires both types of systems to conform to e.i.r.p. uplink limits and power-flux density limits and to utilize CDMA modulation.

The Commission should permit use of the 5 150-5216 MHz for feeder links for low-earth orbit mobile satellite systems. This band is lightly used and the initially-planned government use has never been implemented. In any case, Globalstar can operate without harmful interference into a microwave landing system. Finally, the Commission should assume the primary role for establishing and enforcing limits on RF exposure from mobile satellite transceivers, using the guidelines established by ANSI and IEEE.

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

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OFFICE OF THE SECRETARY

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| for Use by the Mobile-Satellite |) | RM-7806 |
| Service, Including Non- |) | |
| Geostationary Satellites. |) | |

COMMENTS OF LORAL QUALCOMM SATELLITE SERVICES, INC.

Loral Qualcomm Satellite Services, Inc. ("LQSS") hereby respectfully submits its comments with regard to the adoption, in the U.S. Table of Allocations, of spectrum allocations adopted at the 1992 World Administrative Radio Conference¹ for Mobile-Satellite Service including service from low-earth orbit satellite systems, in response to the Notice of Proposed Rulemaking and Tentative Decision, FCC 92-358 (Sept. 4, 1992) ("Notice").²

LQSS is an applicant for authority to construct the Globalstar low-earth orbit satellite system for the provision of voice, data and radio-determination satellite service ("RDSS") in the 1610-1626.5 MHz and 2483.5-2500 MHz bands.³

¹ See, Final Acts of the 1992 World Administrative Radio Conference and Addendum & Corrigendum, Malaga-Torremolinos, 1992 ("Final Acts").

² LQSS does not herein comment on the Commission's decision not to award it a Pioneer's Preference for its innovations in the Globalstar system but reserves the right to address this issue should it become necessary.

³ Annlication of LQSS, File Nos. 19-DSS-P-91 (48) and CSS-91-014, filed June 3, 1991. LQSS notes that paragraph 7 of the Notice inaccurately describes Globalstar as a 24-satellite system which would use 24 additional satellites "to

LQSS also filed a petition for rulemaking regarding allocation of these bands for Mobile-Satellite Service (MSS) along with appropriate technical rules.⁴

For these reasons, LQSS has a vital interest in the outcome of this rulemaking and its impact on the bands proposed for use in the Globalstar system or other satellite systems proposing to operate in these bands.

I. Introduction

The Commission, in this proceeding, seeks comment on the adoption, in the U.S. Table of Allocations (Part 2 of the Commission's Rules) of the allocations of WARC-92 with regard to the 1610-1626.5 MHz, 2483.5-2500 MHz and other bands proposed for use by U.S. MSS systems, including those utilizing non-geostationary satellites. In addition, the Commission seeks comment on a number of technical issues, including the feasibility of the proposed allocation, in the space-to-Earth direction, on a secondary basis, of 1613.8-1626.5 MHz for Mobile-Satellite Service.

LQSS supports the allocation to MSS of the 1610-1626.5 MHz and 2483.5-2500 MHz bands on a primary basis. However, it recommends that the FCC not adopt the allocation of 1613.8-1626.5 MHz in the space-to-Earth direction, even on a secondary basis. As LQSS describes in these comments, operation of a downlink in these bands will cause harmful interference into other MSS satellites, such as those in the Globalstar system, which will use the band for primary uplink transmissions. In addition, the Commission should reconsider its tentative conclusion that the 5150-5216 MHz should not be used for feeder links for LEO MSS systems. This band is currently allocated for RDSS feederlinks on a co-

expand its capacity." LQSS applied for authority to construct 48 satellites and included the 48-satellite system in its financial showing. LQSS has applied for and intends to construct from initial grant a 48-satellite system.

⁴ See, Petition for Rulemaking of LQSS, filed November 4, 1991.

primary basis with aeronautical radionavigation in Region 2 and is lightly used throughout the world. The planned U.S. government use of the band for Aeronautical Radionavigation has not materialized. For these reasons, an ideal situation is created for the Commission to promote private sector use of under-utilized spectrum allocated for both government and non-government services. Thus, LQSS urges that the Commission interpret the current U.S. Table of Allocations to permit the use of this band for feederlinks in LEO RDSS/MSS systems.⁵

II. The Commission Should Allocate the RDSS Bands to Mobile-Satellite Service on a Shared Basis for Multiple Systems

LQSS supports the adoption by the United States of the WARC-92 allocations to the Mobile-Satellite Service of the 1610-1626.5 MHz band in the Earth-to-space direction and of the 2483.5-2500 MHz band in the space-to-Earth direction, both on a primary basis.’ As LQSS has stated in various comments filed in connection with its Globalstar application, and as the Commission itself has recognized, these allocations would allow operation of LEO satellite systems in these bands which will make available new and enhanced voice, data and radiodetermination satellite services to the public.⁷

⁵ Consistent with this position, and implementation of US. proposed systems such as Globalstar, the Commission should now begin preparations for revising Footnote 797A of the International Table of Allocations to add Mobile-Satellite Service.

⁶ Notice, paras. 15-16.

⁷ See Notice, para. 1. “Such non-geostationary satellite systems are expected to *offer* a wide range of new and low-cost services, with a potentially worldwide scope, such as voice, facsimile and data messaging, and fleet surveillance and control. ”

LQSS agrees with the Commission that there is substantial public demand for communications service which can be met by low-earth orbit MSS satellites.’ This demand is evident in the multiple applications for this service and is supported by the growing demand for mobile communications services of all kinds.⁹

With regard to the 1610-1626.5 MHz and 2483.5-2500 MHz bands, it must be acknowledged that the allocation of these bands to the Mobile-Satellite Service at the 1992 World Administrative Radio Conference was premised on the demonstration, by the United States, that the entire band would be available for multiple systems.¹⁰ Based on this understanding, LQSS supports adoption, by the United States, of allocation to the MSS of the 1610-1626.5 MHz band in the Earth-to-space direction, and of the 2483.5-2500 MHz band in the space-to-Earth direction, both on a primary basis. Incorporation of these allocations in the United States Table of Allocations, and the FCC’s rules, will enable the systems which propose operations consistent with multiple entry, such as Globalstar, to provide service.

In addition, the Commission should bear in mind that use of these allocations by United States systems should not preclude the implementation of non-U.S. MSS systems or operation of other services with allocations in the band. Spread spectrum CDMA LEO MSS systems, such as LQSS’s Globalstar, will

⁸ See, Notice, at para. 13.

⁹ See, “Cellular Radiotelephone Systems”, and “Wireless Personal Communications”, U.S. Industrial Outlook, U.S. Department of Commerce, 1992, and Smallsats: Proposals and Prospects for Mobile Communications, Phillips Publishing, 1992.

¹⁰ At WARC-92, many administrations expressed concern that use of these bands, or a portion thereof, by the proposed Motorola system, might preclude use of the bands, on a co-channel basis, by other systems, and thereby result in a worldwide monopoly.

permit use of this spectrum by multiple system operators and other services, such as radioastronomy. Other proposed systems, such as Motorola's, would thwart multiple entry of MSS systems, and cause interference to other services such as aeronautical radionavigation and radio astronomy.

For the same reasons, LQSS recommends strongly that the Commission not adopt in the United States the allocation of the 1613.8-1626.5 MHz in the space-to-Earth direction even on the secondary basis as adopted at WARC-92. LQSS's continuing analysis of the bidirectional use of the L-band indicates, as discussed infra, that space-to-Earth transmissions in this band would cause crippling interference to LEO satellites using the band in the Earth-to-space direction as well as to other communications services. Thus, adopting this allocation for the purpose of permitting even one satellite system would effectively block the operation of other LEO satellite systems, contrary to the Commission's long-standing policy of encouraging open entry and competition in the RDSS bands.¹¹

LQSS submits that it would also be imprudent to adopt the secondary allocation for the L-band. Motorola's Iridium system is the only proposed system which seeks to transmit in the Earth-to-space and space-to-Earth directions in this band.¹² As the Commission noted, Motorola initially said that it could share the

¹¹ See Radiodetermination Satellite Service, 60 RR 2d 298, 301 (1986).

¹² In the Globalstar application filed June 3, 1991, LQSS proposed, in the alternative, three systems. Two systems would operate in the L-band on a bidirectional basis, with the third operating in the L-band in the Earth-to-space direction and the S-band in the space-to-Earth direction. After additional analysis, LQSS has concluded that bidirectional operation in the same band is totally unworkable. This conclusion is not based on a view that LQSS' proposed System A (bidirectional operation) is technically infeasible. Rather, the conclusion is based on the determination that harmful satellite-to-satellite interference, interference into radioastronomy due to out-of-band emissions, and interference to GLONASS and GLONASS-M, which will be coordinated throughout most of the world, would result from bidirectional operation. For this reason, LQSS today has

same spectrum with systems employing CDMA.¹³ However, that claim was made in relation to the prior RDSS applicants prior to the filing of three applications proposing the use of spread spectrum (LQSS, Constellation and TRW). In more recent pleadings, Motorola repeatedly has taken the position that it cannot share with the other LEO MSS systems.¹⁴ Based on Motorola's own statements, it is apparent that authorizing such a system would not only preclude multiple entry and the benefits of competition in the new domestic allocation, but would also impair the United States' international relations by threatening to impose harmful interference on existing users of these bands and future international MSS systems and reneging on commitments made at WARC-92.

Consequently, there are sound reasons for not adopting the secondary allocation for space-to-Earth use of the 1613.8-1626.5 MHz band. The Commission has recognized that there are serious questions about the technical feasibility of the bidirectional allocation,¹⁵ which LQSS's research is confirming. Moreover, economic and international concerns counsel against use of the L-band for bidirectional transmissions. Accordingly, the proposed space-to-Earth allocation for the 1613.8-1626.5 MHz band should be rejected.

separately notified the Commission that it will no longer pursue its System A and System C proposal to utilize the 1610-1626.5 MHz band on a bidirectional basis.

¹³ See, Notice, at para. 10.

¹⁴ See, Motorola Consolidated Petitions to Dismiss and/or Deny Comments, at 48-50, December 18, 1991; Motorola Consolidated Response, at 23 and 49, March 27, 1992.

¹⁵ Notice, para. 29.

III. The Commission Should Adopt the MSS Allocations Which Support Its Multiple Entry Policy

With the exception of the above-referenced proposal to adopt the allocation of 1613.8-1626.5 MHz in the space-to-Earth direction on a secondary basis, LQSS supports the other aspects of the Commission's proposed frequency allocations for the Mobile-Satellite Service. These include the following:

| <u>Band</u> | <u>Service</u> | <u>Direction</u> | <u>Status</u> |
|-------------------|------------------|------------------|---------------|
| 1610-1626.5 MHz | Mobile-satellite | Earth-to-space | Primary |
| 1610.6-1613.8 MHz | Radio Astronomy | | Primary |
| 2483.52500 MHz | Mobile-satellite | space-to-Earth | Primary |

With regard to the proposed allocations for the inter-satellite service for use by satellite crosslinks, e.g., 24.45-24.65 GHz; 24.65-24.75 GHz; 25.25 GHz; 25.5-27 GHz and 27-27.5 GHz, LQSS takes no position at this time. These allocations are not required for provision of service in the Globalstar system, nor in any other system, such as Globalstar, which will utilize terrestrial gateways, rather than satellite crosslinks, to switch communications traffic from one geographic area to another.

The following are the footnotes adopted at WARC-92 which the Commission proposes for inclusion in the U.S. Table of Allocations:

| <u>Footnote</u> | <u>Band</u> | <u>Reauirements</u> |
|-----------------|-----------------|--|
| 731x | 1610-1626.5 MHz | Interim Coordination Procedures (Res.46) Applied |
| | | MSS Stations cannot cause harmful interference to, or claim protection from, stations in the |

| | | |
|-------------|--------------------------|---|
| | | aeronautical radionavigation service, stations operating in accordance with No. 73.2 and fixed stations operating in accordance with No. 730 |
| | 1610-1616 MHz | e.i.r.p. density limit of -15dBW/4kHz on mobile earth stations, unless agreed by affected administrations |
| | 1616-1626.5 MHz | e.i.r.p. density limit of -3dBW/4kHz on mobile earth stations |
| 731Y | 1613.8-1626.5 MHz | MSS subject to Interim Coordination Procedures |
| 7333 | 1613.8-1626.5 MHz | Precludes harmful interference to radio astronomy |
| 734 | 1610.6-1613.8 | Requires administrations to take all practical steps to protect radio astronomy service |
| 753x | 2483.5-2500 MHz | Interim Coordination Procedures PFD from No. 2566 -152 dBW/M ² /4kHz for angles of arrival < 5° -142 dBW/M ² /4kHz for angles of arrival < 25° |

As a participant in WARC-92 and in the U.S. preparations for that conference, LQSS had the opportunity to review the coordination and notification procedures for communications satellites. The procedures of Resolution COM5/8 (now Resolution 46) are a reasonable approach to including non-geostationary satellites in the international notification and coordination process. These procedures would be applied by Footnote 731X.

With regard to Footnote 731Y, LQSS opposes its inclusion, consistent with LQSS's view that the United States should not include the allocation of 1613.8-1626.5 MHz in the space-to-Earth direction for Mobile-Satellite Service. Footnote 731Y would apply the interim coordination procedures to such operations.

Regarding upgrade of the radioastronomy allocation in the 1610.6-1613.8 MHz band to co-primary, LQSS supports this inclusion in the U.S. Table of Allocations, so long as the Commission encourages cooperation in the coordination process by radio astronomy users as well as MSS systems. LQSS has undertaken an extensive analysis of how such coordination can be accomplished and believes that MSS systems such as Globalstar which utilize spread spectrum CDMA can operate compatibly with radioastronomy operations. The specific methodology to achieve such coordination will be addressed in other proceedings.

IV. CDMA Should be Adopted as the Access Method in these Bands to Support the Commission's Goal of Multiple Entry

The Commission, in its Notice, requested comments “on the potential of each of the proposed access methods to support service by multiple LEO licensees in the new MSS bands.”¹⁶ The Commission, stating that it “tentatively conclude(s) that the public interest is best served by multiple MSS LEO operators,” also solicited comments on the “various access methods...proposed, to the extent that these methods might affect the allocation of spectrum for MSS and as to how they might promote competition.”¹⁷

LQSS encourages the Commission to adopt an access method that is consistent with its goals of achieving efficient use of spectrum, multiple entry and competitive provision of service. This access method is CDMA.

The Commission states, in paragraph 19 of its Notice, that it does “not have sufficient information to evaluate the relative merits of the CDMA, TDMA, and

¹⁶ Notice, at para. 19.

¹⁷ Id.

FDMA access schemes proposed to be used by the MSS LEO systems with regard to sharing or whether it is feasible to permit both CDMA and a combined TDMA/FDMA system to share the same spectrum.” LQSS, as well as other applicants, have submitted substantial technical showings with regard to the access plan chosen for its system. With regard to the technical showings concerning CDMA, LQSS has provided extensive information to the Commission concerning CDMA, its spectrum efficiency and its ability to accommodate multiple systems in the following:

| <u>Date</u> | <u>Title/Proceeding</u> | <u>Section</u> |
|-------------|---|-----------------------|
| 6/1/91 | LQSS System Application | Appendix 5 |
| 1/31/92 | LQSS Consolidated Opposition to Petitions to Deny | Technical App., p. 48 |
| 3/27/92 | LQSS Consolidated Reply Comments | Technical Appendix |
| 6/12/92 | LQSS Supplement to Request for Pioneer’s Preference | Entire Document |

In particular, extensive information concerning the capability and performance of CDMA in mobile systems is provided in LQSS's Supplement to Request for Pioneer’s Preference, filed June 12, 1992. This filing contains patents issued to LQSS shareholder QUALCOMM, Inc., for CDMA inventions as well as descriptions of the performance of CDMA in various operating environments. Both the quantitative and qualitative results from various field trials described are relevant to the Commission’s interest in gathering data regarding the ability of various access methods to enable the newly-allocated MSS spectrum to be utilized in the most efficient and publicly beneficial manner.

With regard to making a similar determination as to the designation of a modulation approach, the Commission, in adopting initial rules in the Radio-determination Satellite Service (RDSS), faced a similar challenge. In that case, the Commission decided that CDMA would best promote its goals of spectrum

efficiency and multiple entry.¹⁸ Since that action, continued industry analysis of various access methods confirms the correctness of the Commission's approach. LQSS, in Section IX of the Technical Appendix to its Consolidated Opposition to Petitions to Deny, filed January 31, 1992, provides a detailed discussion of why CDMA permits much greater spectrum efficiency than systems using narrowband FDMA and TDMA approaches. In addition, LQSS, in its system application, provides a detailed Appendix discussing the spectrum efficiency and other benefits of CDMA in a low-earth orbit mobile-satellite system.¹⁹

To provide further assistance to the Commission, Appendix A to this filing provides an overview of the characteristics of CDMA and why it is the most appropriate technology for the promotion of spectrum sharing. Appendix A also provides background information on CDMA, within the context of the terrestrial cellular and PCS environment.

Regarding the capability of CDMA to accommodate multiple satellite systems in the same spectrum, LQSS is involved in development of detailed computer analyses of the sharing situation between LEO and GSO and among multiple LEO satellites in the 1-3 GHz bands. The purpose of this multi-layer interference analysis and simulation program is to quantify the impact of spectrum sharing by multiple systems and to identify system technical and operational parameters which can improve the capability of systems to share.

LQSS recently completed a paper describing this program for submission to the CCIR WP 8D international meeting in January, 1993. LQSS is the only LEO MSS applicant for the 1-3 GHz bands to submit such an analysis. The

¹⁸ RDSS Licensing Order, 60 RR2d 298 (1986).

¹⁹ See, Appendix 5 to LQSS Application.

preliminary conclusions from analysis of multiple system operations is that sharing is feasible and that adjustments of various technical and operational parameters can vastly improve the sharing situation. A copy of this paper is provided in Appendix B.

By way of contrast, the Commission should not adopt TDMA as an access technique for operation of MSS systems in the 1610-1626.5 MHz and 2483.5-2500 MHz bands because:

(1) TDMA systems will not share with other TDMA or FDMA systems, thus requiring exclusive use of spectrum;

(2) According to Motorola, TDMA MSS systems cannot co-exist with other CDMA MSS systems, thus precluding multiple entry.²⁰ Permitting TDMA is likely to lead to inefficient use of the band, warehousing, lack of innovation, through blocking of other methodologies or systems.

(3) Adoption of TDMA, for any portion of the bands, would result in massive administrative costs to the United States government for worldwide coordination due to the pre-emptory nature of a TDMA system and the need to coordinate with other systems throughout the world.

V. The Commission Should Not Adopt Space-to-Earth Allocation for 1613.8-1626.5 MHz for MSS Even on a Secondary Basis

As discussed above, LQSS strongly urges that the Commission not adopt the space-to-Earth allocation for the 1613.8-1626.5 MHz band for MSS even on a

²⁰ See, e.g., Motorola Reply Comments, cited *supra*.

secondary basis. Analysis recently concluded by LQSS demonstrates that radiation from the backlobes and sidelobes of satellites using this band in the space-to-Earth direction would cause harmful interference to other mobile satellites using the 1610-1626.5 MHz band for Earth-to-space transmissions.

Footnote 731X regarding the use of the band 1610-1626.5 MHz precludes uplink e.i.r.p. density limits of greater than -15 dBW/4kHz in the parts of the band used by systems operating in accordance with the provisions of No. 732 (essentially the original GLONASS system, operating up to 1616 MHz pursuant to Article 14 coordination and GLONASS operations up to 1620.9 MHz). In the remainder of the band (essentially 1616-1626.5 MHz), the e.i.r.p. density limit cannot exceed -3dBW/4kHz. These limits apply in the Earth-to-space direction and may apply in the space-to-Earth direction depending on CCIR work in progress. The preliminary indications of such work are that transmissions in the space-to-Earth direction will cause harmful interference. A more detailed discussion of the impact of operation in the space-to-Earth direction on systems utilizing the same band for Earth-to-space transmissions is provided in a paper that has been submitted to the U.S. CCIR WP 8/D.

Since bidirectional operation in the 1610-1626.5 MHz band would cause harmful interference to other MSS systems, the Commission cannot fulfill its goal of promoting efficient use of spectrum and multiple entry through this allocation. Thus, the Commission should not adopt the allocation of 1613.8-1626.5 MHz in the space-to-Earth direction or Footnote 731Y which applies to the space-to-Earth use of the 1613.8-1626.5 MHz band. Space-to-Earth operation in this band also will cause potential adjacent band interference into radioastronomy, and to GLONASS-M (above 1616 MHz). GLONASS must move its operations above 1616 MHz to prevent interference into the newly-primary radioastronomy service.

The Commission is correct in its concerns about bidirectional usage of the L-band with respect to Radio Astronomy services in the adjacent 1610.6-1613.8 MHz portion of the band. Any proposed usage of this band must consider amplified out of band emissions coming from the composite downlink spectrum of the satellite. These contributions must include the maximum loading per beam from that satellite and the adjacent beams on that satellite as well as those from adjacent satellites. These emissions must be controlled within the Motorola satellite. The ability to control the composite transmit spectrum consisting of the contributions of all TDMA bursts within the final amplifier including each carrier's out of passband spurious, intermodulation products, etc., at the input to the downlink antenna will be an extremely formidable task. Note that Motorola can have as many as 240 burst carriers in a single beam, each with their own contribution to the composite out of passband emissions. Attenuation near to the band edge at 1613.8 MHz is next to impossible. This required amplifier filtering, amplifier linearization, signal conditioning, and reduction of passive intermodulation products may prove to be impractical.

VI. The Commission Should Consider Whether it is in the Public Interest to Authorize both Low-earth Orbit and Geostationary Orbit Satellites in the 1610-1626.5 MHz Band

The Commission, in its Notice, proposes that the allocations of 1610-1626.5 MHz and 2483.5-2500 MHz for MSS in the U.S. Table of Allocations not be restricted to satellites in non-geostationary orbits. LQSS does not oppose this approach in principle because it can provide flexibility to the United States in providing for MSS communications in future years, and in making available spectrum to the systems which are most needed in the public interest.

However, with regard to the pending application of AMSC to utilize the 1616.5-1626.5 MHz band on its first generation of geostationary satellites, LQSS urges the Commission not to grant authority to AMSC for use of these frequencies.

As LQSS said in its Petition to Deny AMSC's application, AMSC has not demonstrated a need for these frequencies..²¹ Moreover, AMSC's technical proposal is inconsistent with the international requirements for use of this band adopted at WARC-92.

Today, AMSC already has a license to provide MSS, in the United States, in the 1545-1559 MHz and 1646.5-1660.5 MHz bands, i.e., 28 MHz of spectrum for use by one system on a monopoly basis. In addition, AMSC has pending before the Commission an application to use the Maritime-mobile satellite bands, 1530-1545 MHz and 1626.5-1646.5 MHz, a total of 35 MHz of additional spectrum, for the provision of MSS in the United States. Now, AMSC seeks to use 10 MHz of the precious spectrum which can be utilized by non-geostationary satellite systems to provide new, innovative and needed services within the United States and other countries.

Even if AMSC amended its existing modification application to bring it into conformance with the international e.i.r.p. density limits and changed its proposed modulation to CDMA (with power control), LQSS does not believe that the Commission should authorize AMSC to utilize the 1616-1626.5 MHz band.

LQSS believes that the Commission, with regard to the 1610-1626.5 MHz and 2483.5-2500 MHz bands, has an unparalleled opportunity to provide for the introduction of new systems and new services, to promote new technology and to utilize spectrum to promote multiple entry. Authorizing AMSC as it has requested would not further these goals.

²¹ See, LQSS Petition to Deny Application of AMSC, December 18, 1991, and LQSS Consolidated Reply Comments, March 27 1992, at pp. 20-30. These comments note that, even with modifications to the currently authorized AMSC spacecraft, service to handheld units would not be possible.

VII. The Commission Correctly Dismissed Celsat's Petition for Rulemaking for Use of the RDSS Bands

The Commission correctly dismissed Celsat's petition for rulemaking with respect to the proposed use of the RDSS bands as inconsistent with the WARC-92 allocation for the United States. As the Commission noted, the terrestrial component of Celsat's proposed system is inconsistent with international spectrum allocations. Celsat's petition clearly fails to conform with international allocations and Commission Rules and so is properly dismissed.²²

Celsat's petition should also be dismissed because it has filed no application for the RDSS bands and is thus precluded from being considered with the current processing group of applications for satellite systems which would utilize the 1610-1626.5 MHz and 2483.52500 MHz bands. Celsat failed to file an application on or before the Commission's June 3, 1991 cut-off date for proposed uses of this spectrum. Celsat has not provided any adequate justification for granting a waiver of the cut-off rules. It would be unfair to LQSS and the other parties who met the cut-off date for the Commission to consider Celsat's proposed use of this spectrum in the current processing group.

Finally, the Commission correctly declined to consider Celsat's proposal for use of alternative spectrum in this rulemaking.²³ The instant proceeding and CC Docket 92-166 should consider only rules for use of the RDSS/MSS spectrum. Consideration of rules for use of other spectrum would unnecessarily complicate matters before the parties and delay the implementation of LEO communications service to the public.

²² See 47C.F.R. § 1.401 (e): Petitions "which plainly do not warrant consideration by the Commission may be denied or dismissed."

²³ Notice of Proposed Rule Making and Tentative Decision at 7, n. 15.

VIII. Globalstar Can Effectively Coordinate with GLONASS

LQSS shares the Commission's concern regarding the coordination of MSS systems in the new allocation with GLONASS.²⁴ The Globalstar system can effectively operate compatibly with the GLONASS global navigation system operating in portions of the 1610-1626.5 MHz band. The following LQSS submissions discuss the Globalstar system's ability to coordinate successfully with GLONASS:

| <u>Date</u> | <u>Title/Proceeding</u> | <u>Section/Page</u> |
|-------------|-------------------------------------|-----------------------|
| 6/1/91 | LQSS System Application | App.6, 3.1.2 |
| 1/31/92 | LQSS Cosolidated Opposition to Deny | Tech, App., p.46 |
| 3/27/92 | LQSS Consolidated Reply Comments | Tech. App., pp. 20-22 |

LQSS, unlike other applicants for the 1610-1626.5 MHz band, has provided a detailed interference analysis, referenced above, in its application. In addition, LQSS is developing a detailed plan for actual technical coordination of its system with GLONASS.

IX. The Commission Should Permit Utilization of the 5150-5216 MHz Band for Feeder Links in RDSS/MSS Systems

The Commission, in its Notice, states its concern about use of the 5150-5216 MHz band for feeder links in non-geostationary RDSS/MSS systems. Both LQSS and Constellation Communications, Inc., have proposed the use of this band for

²⁴ Notice, para. 30.

feeder links. The 5150-5216 MHz band is allocated for government and non-government use in the United States. Spectrum analysis commissioned by LQSS indicates that this band is very lightly used on a worldwide basis. Thus, it would be a very useful band for feeder links in conjunction with the Globalstar low-earth orbit RDSS/MSS system. Short-sighted and rigid policies on use of government/non-government spectrum should not preclude the use of this band for feeder links for non-geostationary satellite systems. The Commission's concerns about this band stem from the fact that the band is allocated for the aeronautical radionavigation service on a primary basis and is subject to the following U.S. footnote 307:

The sub-band 5150-5216 MHz is also allocated for space-to-Earth transmissions in the fixed-satellite for feeder links in conjunction with the radio-determination satellite service operating in the bands 1610-1626.5 MHz and 2483.5-2500 MHz. The total power flux density at the earth's surface shall in no case exceed -159 dBW/m² per 4 KHz for all angles of arrival.

Thus, use of this band for feeder links is limited to the RDSS service and must be compatible with operations in the aeronautical radionavigation service. Prior to WARC-92, LQSS and Constellation Communications, Inc. requested that the United States seek revision of international Footnote 797A to clarify that this band could be used for feeder links in conjunction with the Mobile-Satellite Services in addition to the radio-determination satellite service. The Federal Aviation Administration opposed this request on the grounds that the FAA plans to utilize the band for a microwave landing service (MLS).

The FAA, for a number of years, has sought to implement an MLS to assist in flight navigation in the 1531-5090.7 MHz a separation of 60 MHz from the band LQSS would utilize. However, inability to fund this program and other problems have prevented its implementation. Now, use of other communications systems,

including the U.S. Navy's Global Positioning System (GPS) as well as GLONASS, may obviate the need for MLS. In addition, LQSS can demonstrate that its operations will not cause harmful interference to MLS, should such a system be implemented. A discussion of this technical analysis is contained in Appendix C.

In addition, LQSS urges the Commission to consider proposals for the next international radio allocation conference which would amend footnote 797A to add Mobile-Satellite Service. Such use would be consistent with the Commission's policies of promoting the implementation of new mobile communications technologies and enable systems such as Globalstar to utilize feeder link frequencies in bands which will have operational, technical and economic benefits.

Regarding another feeder link consideration, LQSS does not agree with the Commission's interpretation of RR 2613. LQSS believes that the impact of the action of WARC-92 has been overstated. The Commission states flatly that No. 2613 now provides that "non-geostationary satellite operations are secondary to geostationary operations in the fixed-satellite service."²⁵

LQSS does not agree that the new wording of No. 2613 reduces the status of feeder link operations supporting non-geostationary systems to secondary. The new wording of No. 2613 is:

Non-geostationary space stations shall cease or reduce to a negligible level their emissions, and their associated earth stations shall not transmit to them, whenever there is insufficient angular separation between non-geostationary satellites and geostationary satellites resulting in unacceptable interference to geostationary-satellite space systems in the fixed-satellite service operating in accordance with these regulations.²⁶

²⁵ Notice, at **para.** 26.

²⁶ See Final Acts, Article 29, p. 51.

This section identifies a specific situation in which non-geostationary satellites, including feeder link operations, must defer to geostationary satellites in the fixed-satellite service. These situations can be identified and technical and operational measures developed to enable non-geostationary systems to adhere to the regulation. LQSS believes that the Commission should take care not to make overly broad interpretations regarding the status of non-geostationary satellite operations, including feeder link operations. Moreover, interpretations of such provisions should be addressed in the context of international coordination and system operation, rather than the instant proceeding.

X. The Commission Should Utilize ANSI or IEEE Radiation Hazard Standards to Ensure Against Biological Hazards

In the Notice, the Commission raised several issues regarding potential human health hazards from the radiation fields created by devices proposed for use by many of the applicants for voice service in the RDSS bands.²⁷ LQSS has recognized this potential hazard and incorporated a substantial safety factor into the design of its Globalstar system.

First, LQSS supports the Commission assuming the primary role for establishing and enforcing limits on RF exposure from transceivers for MSS licensees. LQSS also supports the current ANSI and IEEE limits. The Commission should address this question from a functional perspective, rather than apply a simplistic peak power limit.

The Commission must recognize that “peak power” is not the most significant factor in determining whether operation of a proposed system represents an RF radiation hazard. The three relevant factors are (1) average EIRP, (2) length of time of exposure, and (3) the user’s distance from the antenna. The ANSI and IEEE standards are based on averaging RF radiation exposure over

²⁷ Notice, paras. 31-32.

six-minute intervals at certain distances from the source. A similar standard should be adopted by the Commission.

The Commission is properly concerned with the potential for human exposure to RF radiation in licensing MSS systems in the RDSS bands but only certain devices present concern. On the one hand, use of hand-held transceivers clearly should be governed by a radiation limit. However, for other types of mobile units, e.g., vehicle mounted antennas, the risk of hazardous RF exposure from LEO systems is negligible, and such devices need not be regulated. In any event, as LQSS has demonstrated, it is possible to provide new and enhanced mobile services to hand-held and other mobile devices within the RF exposure limits set by ANSI and/or IEEE.

XI. Conclusion

As discussed above, the Commission supports adoption in the U.S. Table of Allocations of most of the allocations established at WARC-92. In particular, LQSS recommends allocation to MSS of the 1610-1626.5 MHz band in the Earth-to-space direction and the 2483.52500 MHz band in the space-to-Earth direction, both on a primary basis. These bands should principally be made available for the operation of non-geostationary satellite systems, as the Commission has proposed.

However, the Commission should not adopt a secondary allocation in the 1613.8-1626.5 MHz band for space-to-earth transmissions. Research by LQSS demonstrates that **downlink** operations in this band cause crippling interference into **uplink** operations, as well as other services and, therefore, it is not feasible to allocate this spectrum for bidirectional operations.